

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
6 May 2004 (06.05.2004)

PCT

(10) International Publication Number  
**WO 2004/038874 A2**

(51) International Patent Classification<sup>7</sup>: **H01S 3/00**

(21) International Application Number:  
PCT/US2003/030566

(22) International Filing Date:  
26 September 2003 (26.09.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/414,119 27 September 2002 (27.09.2002) US

(71) Applicant (for all designated States except US): **THE TRUSTEES OF DARTMOUTH COLLEGE** [US/US];  
11 Rope Ferry Road, Hanover, NH 03755 (US).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **BROWNELL, James, Hayden** [US/US]; 2330 Gove Hill Road, Tetford Center, VT 05075 (US).

(74) Agent: **KNOPS, Peter, C.**; Lathrop & Cage LC, Suite 2400, 2345 Grand Boulevard, Kansas City, MO 64108 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

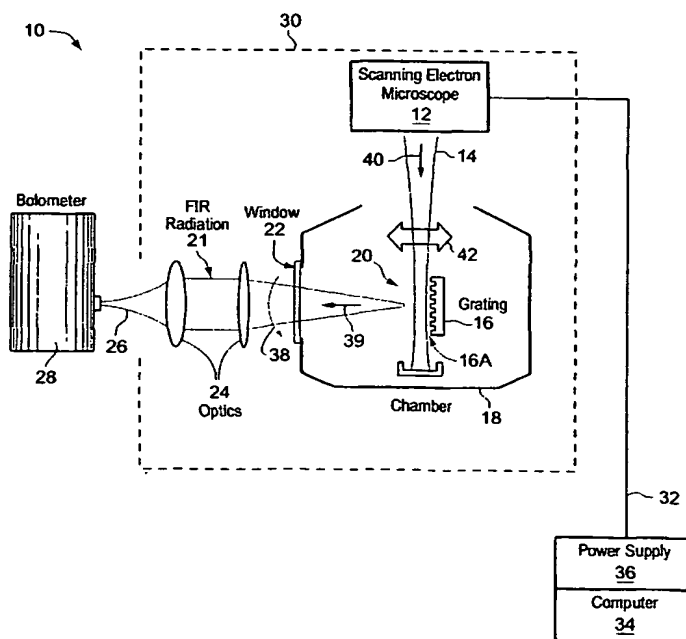
(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Declarations under Rule 4.17:**

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,

[Continued on next page]

(54) Title: **FREE ELECTRON LASER, AND ASSOCIATED COMPONENTS AND METHODS**



(57) **Abstract:** A system generates FIR laser radiation. An electron source generates an electron beam. A grating horn interacts with the electron beam to produce the FIR laser radiation. The grating horn may comprise a flat base and a pair of grating elements attached to the base, each of the grating elements being ruled with a grating period, the grating elements oriented in phase and in substantial symmetry about a normal to the flat base.

WO 2004/038874 A2